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| **Initial Codes** | **Associated extract/evidence** |
| **Ideation and AI tools** |
| Stimulate divergent thinkingOngoing professional learningFoster ideationFiltering out plans | “I use it for continuous learning, to get a different perspective about the same topic, and to get advanced information” (Prakasha et al., p.10).Respondent 24 explained: The integration of ChatGPT for educational purposes has helped me in my professional development. I use ChatGPT mainly for teaching and research purpose. It is really helpful in exploring research ideas, suggesting research questions also giving impressive recommendations (Al-Mughairi & Bhaskar, 2024).Guide-type utilization was used to “consult for ideas” (10 teachers) and “seeking for suggestions” (10 teachers). In this type of utilization, teacher candidates consult ChatGPT for ideas and employ methods such as accepting and filtering appropriate suggestions to create a new, original, and personalized lesson plan according to their own schemes (Tapan-Broutin, 2024). |
| Combining disparate research ideasUsing evidence to generate creative plansBuild teacher confidence in educational planningJustifications aid pedagogical thinking | One interviewee explained: “Comparing ChatGPT with Google search, I spend time combining information and tailoring them to develop creative ideas in my lesson plan, and sometimes I am not confident with what I develop. However, ChatGPT helps in this process, and I learn from the ideas generated as it explains how and why the lesson is tailored in a certain way, saves our time, and reduces efforts” (ElSayary, 2023). |
| **Accessibility of research** |
| Reliable retrieval of research insightsCondensed information summaries | Teachers explained: “that although ChatGPT can possibly answer all their questions, especially on academic research and creating lesson templates and activities, it does not give them everything they need” (Ulla et al., p. 176).Processing a large amount of information in a short span by ChatGPT has provided a huge relief to university teachers (Bhaskar & Rana, 2024, p. 8).Generative AI applications reported by educators (n=280) included: research and writing aid; using GenAI tools to support research tasks, including researching a topic or concept and summarising articles, books and videos (Department for Education, 2024). |
| Instantaneous solution makingAccessible literature summaries | Participant 17 explained: “As a teacher, I would have always the opportunity to use ChatGPT to ask questions, like right away answers to my questions. I do research, especially if I am writing the literature review, ChatGPT can help (Ulla et al., p. 176).Participant 7 explained: “I employ ChatGPT in teaching all lessons in the research methodology course since it is effective to help teachers summarize ideas in research articles, generalize outlines and provide different research products for reference” (Nguyen Thi Thu, 2023). |
| Keeping abreast of recent researchOvercoming access difficultiesIncorporating latest teaching approaches | Additionally, it was thought that the platform offers “access to current research topics and specific materials”, allowing participants to stay up-to-date with the latest research and access materials that may have been previously difficult to obtain (Govindarajan & Christuraj, 2023).It was reported that ChatGPT may assist the faculty in explaining challenging concepts more effectively, ensuring that their teaching resonates with students, allowing educators to stay up-to-date with the latest research, and pedagogical techniques (Hasanein & Sobaih, 2023). |
| **Enabling personalised instruction** |
| Finding and incorporating learner-centred activitiesInforming the scaffolding of contentUsing AI to differentiate instructionChallenging students by aligning with Bloom’s theory | ChatGPT technology can facilitate the “integration of more learner-centered materials and activities”, promoting active learning and engagement. Teachers can also leverage ChatGPT to “encourage the preparation and use of learner-specific study materials”, enabling learners to engage with language learning materials that are relevant and specific to their needs (Govindarajan & Christuraj, 2023).Interview participants mentioned ChatGPT is helpful in scaffolding content and supporting learning experiences, and some mentioned that it could be an advanced version of Google Search (ElSayary, 2023).All teachers agreed that using ChatGPT for lesson planning includes differentiating instruction and creating personalized education plans for students. They added that they could use ChatGPT to generate questions or prompts aligned with Bloom's taxonomy, which can help challenge students at different levels of cognitive complexity (ElSayary, 2023). |
| Going beyond traditional approachesAcquiring pedagogical knowledge | Some participants explained: AI tools and help to supplement traditional teaching approaches (5 respondents) (Derakhshan & Ghiasvand, 2024).As shown in table 3, a tutor type utilization, 8 teachers reported using generative AI tools to “Obtaining the scientific knowledge” and 10 teachers reported using the tools to “Obtaining the pedagogical knowledge”. Teachers’ used prompts such as ““How can I teach algebra to students?” (Tapan-Broutın, 2024). |
| **Generating contextualised outputs with AI** |
| Finding optimally challenging materialsContextualising outputs to students and educational requirements | Teachers in UTAS, Nizwa started using ChatGPT for getting level appropriate reading practice texts (in-line with the theme taught in each unit). By “contextualizing study materials to the level and context of learners”, ChatGPT can provide language learners with relevant and engaging content that matches their proficiency level and interests (Govindarajan & Christuraj, 2023). |
| **Efficiencies in AI technology use** |
| Efficient transition from old to new digital toolsAdaptability ensures enhanced implementation | Study findings suggest that “teachers are likely to be able to adapt to using gen AI tools in the same way as they have evolved to use Google search, leading to better utilisation of AI tools to support teaching and learning” (Moorhouse & Kohnke, 2024, p. 5) |
| Time saving and efficiency gainsVaried research outputs | Due to the speedy generation of the output and handling multiple aspects at a time, it results in efficiency and timesaving. It can be used for note preparation, generating case-lets, write-ups or brief summaries of contemporary research topics, it can be done all in a few seconds (Bhaskar & Rana, 2024, p. 8).Additionally, Respondent 44 explained: “Due to shortage of time, I am unable to conduct a thorough search on the contemporary topics of research, ChatGPT optimizes the search process and generates ideas” (p. 8).Teacher 6 explained: I think this bot is good enough for research in that it can save our time finding resources and information related to our research topic (Derakhshan & Ghiasvand, 2024). |
| **Enhancing specialisation and knowledge growth** |
| Knowledge accrualAccess to specialist literature | Respondents perceived that AI chatbots’ role would primarily enhance knowledge acquisition, research, and clinical decision-making, mirroring the broader medical education literature. Facilitating information gathering, evidence-based literature access (Uribe et al., 2024). |
| **Supporting educational management and decision making** |
| Aiding evidence-informed decision makingEvaluating educational policyAnalysed data informs educational management | The participants suggested that ChatGPT could support school educational decision-making with evidence and recommendations. For example, what activities should be used by students with attention deficit hyperactivity disorder? What is a positive educational policy? This is because ChatGPT can provide analyzed data from different resources as evidence or recommendations to the management team for decision-making (Chiu, 2023). |
| Resolving critical educational incidentsAiding classroom management | According to one educator, “I could get help for critical incidents that are related to not only teaching content but also classroom management” (Kartal, 2024). |
| **Informational deficits** |
| Evidential questions left unansweredPartial information retrieval | Teachers explained: “that although ChatGPT can possibly answer all their questions, especially on academic research and creating lesson templates and activities, it does not give them everything they need” (Ulla et al., p. 176).Yeah, it gives us something, but it is not everything” (Ulla et al., 2023, p. 176). |
| **Inaccurate and unreliable AI outputs** |
| Avoid AI dependenceOccasionally unreliable information retrievalInaccuracies compromise educational outcomes | Participant 17 explained: “So, I think it is really beneficial, but I always see that I don't depend on it because it is artificial intelligence. We could not trust the words if everything ChatGPT is giving is valid and reliable. Yeah, it gives us something, but it is not everything” (Ulla, 2023, p. 176).Teachers also “pointed out ChatGPT’s lack of authenticity and reliability in the information it shares” (Ulla et al., 2023, p. 176).20 respondents mentioned these tools may only sometimes provide accurate and reliable responses; hence, they might lead to inaccurate outcomes in teaching or research (Govindarajan & Christuraj, 2023). |
| Source verification barriersCross-checking AI outputs with traditional sources | Participant 17 acknowledged further that: “ChatGPT lacks the capability to do source verification, requiring cross-referencing of the information it presents with reliable sources” (Ulla et al., p. 176).A threat mentioned by participants was the “use of non-reliable resources generated by ChatGPT”. The resource materials created by ChatGPT may not always be reliable as there is no reference to the source (Govindarajan & Christuraj, 2023).To verify accuracy and prevent bias, participants suggested cross-referencing the AI-generated information with other reliable sources, such as textbooks, articles, and course materials (Kartal, 2024). |
| Recommended sources not searchableUnreliable analysis of quantitative data | Results shown in table 3 highlight educators’ concerns for using AI for research. 25 participants expressed concerns over the reliability, authenticity, accuracy, and validity of outputs. For example, “Many of its suggested sources are not searchable on Google, websites, and databases. It also produces inconsistent data analysis of quantitative data” (Gustilo et al., 2024). |
| Potentially outdated informationFalsified research outputsFalse information compromises learning materials and plans | A limitation mentioned by participants was the potential for outdated or inaccurate information. When using ChatGPT, users are informed that the AI system’s training data will extend only up to September 2021, limiting its ability to offer current updates in technology (Davis and Lee, 2023).The AI approach generated false research articles by well-known authors and journals in the field with complete DOI numbers. These inaccuracies made it unsuitable for finding external reading materials for graduate-level coursework. The risk of outdated or incorrect information was an issue when using AI to generate lesson plans and activities (Davis and Lee, 2023). |
| Problems reconciling input-output gapsAdjusting suboptimal outputs to meet pedagogical demandsModifying outputs to meet knowledge gaps | The analysis revealed that when there were deficiencies or inaccuracies in the response generated by ChatGPT, teacher candidates requested corrections or adjustments from ChatGPT to align it with their requirements. The statements mentioned by T5 in her journal regarding the adjuster-type utilization are as follows: “No matter how much I tried to provide detailed information, it couldn’t come up with anything logical, or rather, the story wasn’t really relevant to the subject” (Tapan-Broutın, 2024).The modifications made by the teacher candidates to the lesson plans generated by ChatGPT primarily included structural changes, changes related to classroom management, changes related to pedagogical knowledge, changes related to content knowledge, and changes related to technological content knowledge (Tapan-Broutın, 2024). |
| **Peer checking of AI outputs** |
| Engaging with peers to minimise errors | Additionally, they emphasised the value of actively participating in conversations with teachers and peers to confirm the facts and refute any discrepancies. According to one participant, “I always make sure to compare the content generated by ChatGPT with other sources and engage in discussions with my colleagues to ensure its accuracy and credibility” (Kartal, 2024). |
| **Differential use of AI and RIEP** |
| RIEP at tertiary level more prominent | The functions for which teachers use AI tools were found to vary depending on the education level. Teachers in primary and secondary education primarily use these tools for creating various content such as games, presentations, notes, and exercises. Teachers in higher education tend to utilize AI tools for both academic purposes that benefit themselves (e.g., information retrieval) and their students (e.g., explaining how AI works, allowing students to experiment with AI tools, or enabling students to create images) (Galindo-Dominguez et al., 2023). |
| Inequalities in access impact quality | There is also some concern about inequality resulting in disparity in research quality: “Unequal access to AI-powered DWTs raises concerns about disparities in research quality and opportunities, as financial resources and technological infrastructure may vary across researchers and institutions*”* (Galindo-Dominguez et al., 2023). |
| Competence a roadblock to AI utilisationMixed research-informed adoption of AI | Although the participants showed acute awareness that GenAI tools will affect their professional practice, most expressed a lack of competence in using them. Daphne and Steven had used GenAI tools in their research, while the other participants had ‘experimented’ with ChatGPT and other tools but had not used them in any professional tasks (Moorhouse & Kohnke, 2024, p. 5). |
| **Challenges with developing AI Inputs** |
| Limited evidence to guide RIEP using AI | Respondents also reported potential instances of misuse:Lack of a research base and evidence to support the use of AI in dental education (Uribe et al, 2024). |
| Difficulty contextualising AI outputsCareful crafting of promptsComplex tasks require more subtle promptsCautionary approach to appraising and applying outputs | Participant T1 reported some challenges of using AI tools: …ensuring that the resources and ideas generated by ChatGPT are accurate, relevant, and appropriate for the specific context and learners. The accuracy of the responses depends on the input's quality and the task's complexity (ElSayary, 2023).Teachers recognize that ChatGPT doesn’t possess the necessary expertise or contextual understanding required for producing high-quality and accurate literature reviews. Respondent 7 explained: I have concerns about the reliability and accurateness of the data provided by ChatGPT. I need to be cautious and critically evaluate the information generated by ChatGPT to ensure its accuracy and reliability before incorporating it into their teaching practice (Gustilo et al., 2024) |
| **Impacts on professional autonomy and judgement** |
| Blurring lines between own ideation and generative AILimited autonomous cognitionBalancing genAI usage with independent research and thought | Another issue that was raised was the difficulty in telling the difference between one’s own thoughts and AI-generated information, which might impair the capacity for autonomous thought. Participants emphasised the significance of juggling their usage of ChatGPT with independent research and their own critical thought (Kartal, 2024).According to the interview findings, it’s essential to strike a balance between AI-generated information and original ideas in order to avoid becoming overly dependent on technology and to preserve critical thinking skills (Kartal, 2024). |
| Confirmation of preconceptionsValidation of pre-prepared materials | Findings showed that some teacher candidates had used ChatGPT to seek approval for their ideas; this type of utilization is referred to as “validator-type utilization”. In this type of utilization, teacher candidates expressed their own ideas for a specific task and sought validation from ChatGPT (Tapan-Broutın, 2024).Similarly, T8, in her journal, used the following statements regarding the validator-type utilization of ChatGPT: “I wanted to ask if the material is suitable for the 7th-grade level, and it told me that the material is appropriate for the 7th-grade level and can provide effective learning through the use of proper teaching methods” (Tapan-Broutın, 2024). |